layers and that the warming and cooling effect of the air upon the sea is of secondary importance, has been substantiated by the results of this expedition. Mean air temperature was found to have a strong tendency to follow mean surface temperature. Only rarely was the difference between the two as much as 2° C. These differences though slight are of the utmost importance in atmospheric processes and necessitate the most careful observations of sea and air temperatures. The air was, as a rule, warmer than the sea by day and cooler by night, but 68 per cent of the averages give air temperatures lower than sea temperatures. Variations in humidity correspond closely to the variations in temperature differences between water and air. Moreover, variations in relative humidity coincide almost exactly with variations in absolute humidity.

In the study of gain and loss of heat the author reaches the same conclusions as Harvey;[1] namely, that evaporation is the chief cause for the loss of heat from the sea, excess of outward radiation, and direct convection to the air being of secondary importance; and that the stronger the heating of the surface layers the less the heating of the subsurface layers, due to greater stability and hence lessened convection to lower levels.

The study of seasonal variations was hampered by the fact that the author could find in literature only three cases where serial observations for deep offshore parts of the eastern North Atlantic have been taken at different seasons at the same geographical position. The author finds on the whole fairly good indication of "direct agreement between annual variations of the surface temperature toward the end of the winter and the temperatures for a considerable time (several months) afterward at 50 and 100 meters," p. 61.

Throughout the volume Helland-Hansen has amplified his discussion with results of his other observations, particularly those made in the North Atlantic in collaboration with F. Nansen. It is regrettable that the publication of results of such expeditions are so delayed. Such delays may only be compensated for by thorough and careful studies of results, such as are exhibited in this publication. The whole volume serves to emphasize the necessity for cooperation between investigators in physical oceanography and meteorology and for the collection of more detailed and accurate marine meteorological data.

[1] Harvey, M. A. Evaporation and Temperature Changes in the English Channel J. Marine Biol. Assoc., v. 13, pp. 67.8–692, 1925

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